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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/653,791	09/02/2003	Akio Ohba	81617 [SC-70003US]	6922
22242 7590 05/31/2007 FITCH EVEN TABIN AND FLANNERY 120 SOUTH LA SALLE STREET SUITE 1600 CHICAGO, IL 60603-3406			EXAMINER REPKO, JASON MICHAEL	
			ART UNIT 2628	PAPER NUMBER
			MAIL DATE 05/31/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/653,791	OHBA, AKIO	
	Examiner	Art Unit	
	Jason M. Repko	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-7, 9-18, 20-29, 31, 32 and 34 is/are allowed.
- 6) ☒ Claim(s) 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. **Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 7,133,041 to Kaufman et al in view of Kwan Liu Ma, James S. Painter, Charles D. Hansen, Michael F. Krogh, "A Data Distributed, Parallel Algorithm for Ray-Traced Volume Rendering," October 25, 1993, Proceedings of the 1993 Symposium on Parallel Rendering, p. 15-22 (Ma et al).**

4. With regard to claim 19, Kaufman et al discloses "an image processing method comprising dividing a space into three-dimensional subspaces which are allowed to spatially overlap one another (*lines 8-11 of column 66: "When switching from one subvolume to the next, this algorithm always results in overlap as shown in the example bounding boxes in FIG. 53."*), to generate rendering data having depth information on a pixel by pixel basis, and consolidating

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the rendering data of at least one three-dimensional object in each of the subspaces by evaluating a distance in depth direction on a pixel by pixel basis (*lines 41-45 of column 17: "In order to perform the accurate mixing of volumes and geometry, for opaque geometric objects, the Z-buffer image is preferably written to the compositing buffer 60. The compositing unit 60 must perform a z-comparison prior to blending each new sample."*) wherein each of the three-dimensional subspaces is defined by boundaries and the boundaries of the three-dimensional subspaces are allowed to spatially overlap one another (*lines 29-30 of column 10: "FIG. 53 shows a portion of a colon with overlapping subvolume boxes created with a greedy algorithm."*).

5. Kaufman et al does not use the language "evaluating a distance in depth direction on a pixel by pixel basis"; however, one of ordinary skill in the art would recognize that this feature is inherent to compositing unit 60, which uses the Z-buffer image and z-comparison, as the z value is the depth component and the Z-buffer image comprises pixels assigned a z value.

6. Kaufman et al does not disclose "performing rendering processing independently by subspace unit on at least one three-dimensional object in each of the subspaces." Ma et al discloses "an image processing method comprising dividing a space into three-dimensional subspaces which are allowed to spatially overlap one another (*Figure 2*) performing rendering processing independently by subspace unit on at least one three-dimensional object in each of the subspaces (*section 3.3: "We use ray-casting based volume rendering. Each computer can perform raytracing independently; that is, there is no data communication required during the subvolume rendering. All subvolumes are rendered using an identical view position and only rays within the image region covering the corresponding subvolume are cast and sampled."*)

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wherein each of the three-dimensional subspaces is defined by boundaries and the boundaries of the three-dimensional subspaces are allowed to spatially overlap one another" (*section 3.2: "This will reduce the cost of the merging since compositing need only be applied where subimages overlap as shown later."*).

7. With regard to claim 19, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate, in Kaufman et al, the step of "performing rendering processing independently by subspace unit on at least one three-dimensional object in each of the subspaces" as taught by Ma et al. The motivation for doing so would have been to accelerate rendering as stated by Ma et al in the first paragraph of section 1. Therefore, it would have been obvious to further modify Kaufman et al with Ma et al to obtain the invention specified in claim 19.

Allowable Subject Matter

8. Claims 1-7, 9-18, 20-29, 31, 32 and 34 are allowed.

9. With regard to claim 1, U.S. Patent Application Pub. No. 2002/0015055 to Foran discloses "an image processing apparatus comprising:

- a. a rendering processing unit which derives a three-dimensional subspace which contains the three-dimensional objects belonging to the same group to be an independent rendering unit (*paragraph [0040]: "First, the dimensions of the scene are bounded by a rectangular volume as shown in FIG. 2. Next, this volume is decomposed into rectangular subvolumes as shown in FIG. 3 such that each subvolume includes a portion of the overall scene... The position of each vertex is compared with the positions of the planar sides of the subvolumes to determine the subvolume to which the graphics*

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primitive should be assigned."), and generates independent image data for each subspace (paragraph [0044]: *"In FIG. 5, at a step 506, the viewing position is communicated to each GPU. At a step 508, each GPU renders the graphics data that has been allocated to it."*); and

b. a consolidation unit which generates final output image data to be displayed by consolidating the image data generated for each subspace (paragraph [0045]: *"At a step 512, the outputs of the individuals GPUs are combined by blending."*; Figure 7),

c. wherein the grouping unit groups three-dimensional objects into groups in such a manner that the three-dimensional subspaces, each of which contains at least one three-dimensional object belonging to the same group, are allowed to spatially overlap one another (paragraph [0040]: *"Where vertices of a graphics primitive indicate that it spans a boundary between subvolumes, the graphics primitive will be assigned to each subvolume."*).

10. Foran does not expressly disclose "a grouping unit which selects rendering strategy according to characteristics of input three-dimensional objects and groups the three-dimensional objects into groups in such a manner that the three-dimensional objects to which the same rendering strategy is applied are grouped into the same group; performing rendering processing individually on the subspace by applying the group by group different rendering strategy" or "wherein each of the three dimensional subspaces is defined by boundaries and the boundaries of the three-dimensional subspaces are allowed to spatially overlap one another." It would not have been obvious to a person of ordinary skill in the art first to incorporate the feature "wherein each of the three dimensional subspaces is defined by boundaries and the boundaries of the three-

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dimensional subspaces are allowed to spatially overlap one another” in addition to the aforementioned features not found in Foran.

11. With regard to claim 1, Kaufman and Ma et al disclose the limitations of claim 19.

However, neither reference discloses a grouping unit as disclosed in claim 1 or a “group by group different rendering strategy.”

12. Claims 2-6, 9-16 and 25-29 are allowable due to their dependency from claim 1.

13. Claims 17, 18 and 20-24 recite limitations similar in scope to those found in claim 1, and are allowable by the similar rationale.

14. Claims 31, 32, 7 and 34 are allowable for the reasons presented in the Office Action dated 21 November 2006.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Repko whose telephone number is 571-272-8624. The examiner can normally be reached on Monday through Friday 8:30 am -5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JMR


Ulka Chauhan
Supervisory Patent Examiner